Nephron Sparing Surgery for Renal Cell Carcinoma With Normal Contralateral Kidney: 25 Years of Experience

Sascha Pahernik,* Frederik Roos, Christian Hampel,† Rolf Gillitzer, Sebastian W. Melchior and Joachim W. Thüroff‡

From the Department of Urology, Johannes Gutenberg University, Mainz, Germany

Purpose: We report the long-term results of our consecutive series of 504 patients who underwent NSS for cancer suspicious, solid renal tumors in the presence of a normal opposite kidney at our institution since 1979.

Materials and Methods: A total of 715 patients underwent NSS since 1969, including 504 for an elective indication, that is with a normal opposite kidney. Of these patients 381 (75.6%) had RCC, 123 (24.4%) had cancer suspicious benign lesions, including 53 (10.5%) with oncocytoma, 33 (6.5%) with angiomyo(lipo)ma, 23 (4.6%) with a complicated cyst and 13 (2.8%) with other benign lesions. Of the 381 patients with RCC 283 (74.3%) had clear cell, 68 (17.8%) had papillary and 30 (7.9%) had chromophobic RCC. Mean tumor diameter was 3.0 cm (range 0.5 to 11.0). Mean followup was 6.77 years (range 0.2 to 24.1). The oncological outcome was studied, including pathological features associated with tumor progression.

Results: Estimated cancer specific survival rates at 5 and 10 years were 98.5% and 96.7%, respectively. Estimated survival rates free of distant metastasis at 5 and 10 years were 97.5% and 95.1%, respectively. Nine patients with localized RCC experienced local recurrence after NSS. Estimated survival rates free of local recurrence at 5 and 10 years were 98.3% and 95.7%, respectively.

Conclusions: The long-term results of our series support the concept of organ sparing surgery for RCC in the presence of a normal opposite kidney with excellent long-term survival and a low tumor recurrence rate.

Key Words: kidney; carcinoma, renal cell; abnormalities; treatment outcome; surgical procedures, elective

NSS is the method of choice for the surgical removal of solid renal tumors in a single kidney, in bilateral renal tumors or if chronic renal failure is present or impending (imperative indication). Radical nephrectomy was the standard treatment for localized RCC with a normal contralateral kidney. However, the introduction and increasing use of modern imaging techniques, such as renal ultrasound and abdominal CT, have led to the detection of steadily increasing numbers of predominantly small renal tumors in the last 2½ decades. Since the descriptions of elective NSS in the presence of a normal contralateral kidney,[1–4] there has been ever growing interest in this surgical strategy.

We report the long-term results of our consecutive series of 504 patients who underwent NSS for solid renal tumors in the presence of a normal opposite kidney. The approach has been used at our institution since the description of our first cases in the collation of the European Intrarenal Surgery Society.[2]

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* Correspondence: Department of Urology and Pediatric Urology, Johannes Gutenberg University, Langenbeckstrasse 1, 55101 Mainz, Germany (telephone: xx49/6131-171; FAX: xx49/6131-232986; e-mail: Pahernik@urologie.klinik.uni-mainz.de).

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METHODS

At our institution a total of 715 patients underwent NSS for cancer suspicious, solid renal tumors between 1969 and 2004. Those done for an imperative indication, such as solitary kidney, bilateral disease or chronic renal failure, were excluded from the current analysis. In addition, patients with von Hippel-Lindau disease, transitional cell carcinoma or Wilms tumor, patients with tumors of other than renal origin and patients with previous or concurrent metastases, or nodal disease of RCC were also excluded from analysis. After these exclusions there remained 504 patients who underwent NSS with curative intent for a solid renal tumor suspicious for renal cancer in the presence of a functionally normal contralateral kidney since 1979. Of these patients 381 (75.6%) had RCC and 123 (24.4%) had benign lesions, including 53 (10.5%) with oncocytoma, 33 (6.5%) with angiomyolipoma, 23 (4.6%) with a complicated cyst and 13 (2.8%) with other benign lesions, such as leiomyoma, cystic nephroma or a fibrotic tumor (table 1).

Table 1 shows patient demographics. Mean age at surgery was 60.2 years (range 23.5 to 84.1). Mean followup was 6.77 years (range 0.2 to 24.1). Of the 381 patients with RCC 335, 262, 210, 100 and 11 survived 1, 3, 5, 10 and 20 years, respectively.

Preoperative imaging usually includes ultrasonography of the kidneys, excretory urography and CT or magnetic resonance imaging. The surgical technique, which has been described in detail previously[3] and which was recently newly illustrated,[5] entails kidney exposure through a supra-

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TABLE 1. *Patient data*

No. pts (1979–2004)	504
Mean yrs followup (range)	5.7 (0.4–24.1)
Mean age st surgery (range)	58.0 (14.6–86)
No. men (%)/women	327 (64.9)/177 (35.1)
No. benign (%):	123 (24.4)
Oncocytoma	53 (10.5)
Angiomyo(lipo)ma	33 (6.5)
Complicated cyst	23 (4.6)
Other	13 (2.8)
No. malignant RCC (%)	381 (75.6)

costal incision in the 10th or 11th intercostal space. Gerota's fascia is opened and the kidney is freed from fatty tissue. In most cases the artery is clamped and slush ice is applied to the kidney surface. Cone or wedge resection of the kidney is performed, removing at least 1 to 2 mm of normal tissue around the tumor. Biopsies are taken from the renal margins of the resection and sent for frozen section to ensure complete tumor excision. For our analysis tumor size was analyzed as the maximum diameter in the surgical specimen. Staging was revised according to the 2003 TNM classification system and tumor grading was based on the 1986 classification of Thoenes et al.[6]

Outcome parameters, such as overall survival, cancer specific survival, survival free of distant metastasis and survival free of local recurrence, were estimated using the Kaplan-Meier method. Univariate proportional hazards regression models were used to evaluate clinical and pathological features. The relationships between outcome parameters, and clinical and pathological features were analyzed using risk ratios and the 95% CI. Data are presented as the median and range.

RESULTS

Table 2 shows pathological features in 504 patients who underwent elective NSS with curative intent for cancer suspicious, solid renal tumors in the presence of a normal opposite kidney. Of the 381 patients with RCC 283 (74.3%) had clear cell RCC, 68 (17.8%) had papillary RCC and 30 (7.9%) had chromophobe RCC. As measured in the surgical specimen, mean tumor diameter was 3.0 cm (range 0.5 to 11.0). Of the RCCs 321 (84.3%) were stage pT1a, 43 (11.3%) were pT1b, 7 (1.8%) were pT2, 9 (2.4%) were pT3a and 1 (0.3%) was pT3b, while 120 (31.5%) were grade 1, 234 (61.4%) were grade 2 and 27 (7.1%) were grade 3. Intraoperative frozen section revealed negative surgical margins in all cases. RCC multifocality was present in 15 cases (3.9%).

TABLE 2. *RCC pathological features*

Mean cm tumor diameter (range)	3.0 (0.5–11.0)
No. multifocality (%)	15 (3.9)
No. tumor stage (%):	
pT1a	321 (84.3)
pT1b	43 (11.3)
pT2	7 (1.8)
pT3a	9 (2.4)
pT3b	1 (0.3)
No. grade (%):	
I	120 (31.5)
II	234 (61.4)
III	27 (7.1)
No. histological subtype (%):	
Clear cell	283 (74.3)
Papillary	68 (17.8)
Chromophobe	30 (7.9)

Of the 381 patients with localized RCC 91 had died by the time of this analysis. Mean time from NSS to the latest followup in the 290 survivors was 5.74 years (range 0.4 to 23.9). Estimated overall survival rates at 5 and 10 years were 88.3% and 69.2%, respectively. Seven patients died of metastatic RCC. Mean time from NSS to death from RCC was 4.24 years (range 1.36 to 7.92). Estimated cancer specific survival rates at 5 and 10 years were 98.5% and 96.7%, respectively (fig. 1). When stratified between pT1a vs pT1b tumors, cancer specific survival rates were 99.1% vs 96.9% and 96.9% vs 96.9% at 5 and 10 years, respectively. A total of 11 patients had RCC distant metastases after NSS, including the 7 who died. Mean time from NSS to RCC distant metastasis was 3.76 years (range 0.54 to 7.49). Estimated survival rates free of distant metastasis at 5 and 10 years were 97.5% and 95.1%, respectively.

Table 3 shows univariate analysis of associations between clinical and pathological parameters, and distant metastasis and death from RCC. A trend was observed that stage, multifocality, grade greater than 2 and tumor size more than 4 cm were associated with systemic tumor progression. However, none of the associations achieved statistical significance (table 3). Multivariate analysis showed similar results.

Nine patients with localized RCC experienced local recurrence after NSS (table 4). Estimated survival rates free of local recurrence at 5 and 10 years were 98.3% and 95.7%, respectively (fig. 2). When stratified between pT1a vs pT1b tumors, estimated survival rates free of local recurrence at 5 and 10 years were 98.5% vs 96.7% and 95.3% vs 96.7%, respectively. Mean time from NSS to local recurrence was 5.82 years (range 3.05 to 15.83). Primary RCC size was 4.0 cm (range 2.5 to 6.0). Two primary tumors were grade 1 (22.2%), 6 were grade 2 (66.7%) and 1 was grade 3 (11.1%).

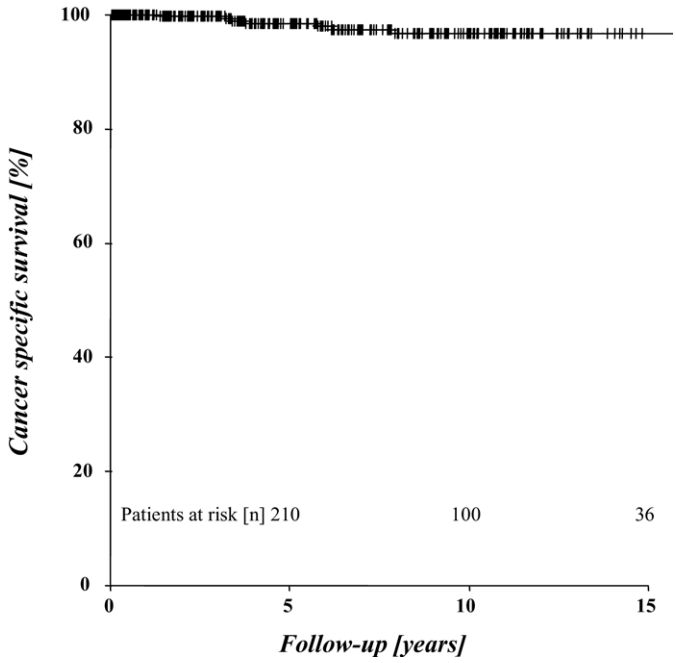

FIG. 1. Cancer specific survival rate after elective NSS. Estimated rates at 1, 3, 5 and 10 years were 100%, 99.7%, 98.5% and 96.7%, respectively.